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Knowledge, Demand and Habits Towards Novel Coronavirus Disease (COVID-19) of College Students: Cross-Sectional Survey Study of Southwest China

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ABSTRACT
Purpose: To determine the knowledge, information acquisition channels, and information topics of college students during the COVID-19 epidemic, and to provide decision makers with empirical data to help formulate future health strategies and health education strategies. Methods: Using online surveys, a total of 3059 people were surveyed among college students in three provinces in southwestern China. SPSS was used for data analysis. Results: 56.16% of college students'COVID-19 knowledge scores were good or above. During the epidemic, college students obtained the most information about COVID-19 through TV (86.6%) and the Internet (79.4%), and more than 80% of students were susceptible to COVID-19. All kinds of related knowledge are hoped to be further understood. Gender, grade, major, current residence, information needs, information acquisition channels, and information attention preferences will all affect the level of COVID-19 knowledge of college students. Conclusion: It is recommended that a variety of channels should be adopted more accurately, in accordance with the behavior and demand characteristics of different populations, and a variety of publicity methods should be used to timely and efficiently transmit disease-related information to the public, and guide the public to respond more actively to disease prevention and control. Combination of prevention and control methods, and detailed disease prevention and control content.

Keywords: *Knowledge, Demand ,Habits, College Students,COVID-19*

1. INTRODUCTION

On December 29, 2019, a new type of coronavirus pneumonia (COVID-19) [1]caused by the "SARS-CoV-2" coronavirus was first discovered in Wuhan, China. Subsequently, the disease spread rapidly throughout the country. The government responded immediately and launched an unprecedented national emergency plan, including closing unnecessary businesses, public transportation, schools, and universities, publishing some preventive manuals, and providing health education to people through national and local TV programs and social media. Past research evidence of severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS) and Ebola shows that the public's disease-related knowledge plays a decisive role in controlling the epidemic of the disease[2-4]. In the early stage of COVID-19, we conducted a nationwide survey (January 30, 2020). The results of the study showed that only 5.4% of the public's COVID-19 knowledge score was classified as good or above. At the same time, we have also observed significant differences in the knowledge levels of different groups of people [5]. Therefore, the government not only needs to pay attention to the public's knowledge level of COVID-19, but also needs to understand the differences in behavior between different groups of people, which will help formulate response strategies. Based on this, we selected three provinces with different COVID-19 risk levels from the southwest region and conducted an online survey of undergraduate students living in these three provinces. We hope to obtain these data of college students: COVID-19 knowledge, information acquisition methods, information attention content, information needs, information acquisition habits. We will study the following issues:

How do college students know about COVID-19?

What information channels do college students use to obtain COVID-19 information every day?

What COVID-19 information topics do college students pay attention to every day?

What information do college students want to learn about COVID-19?

Before the COVID-19 epidemic, what channels did college students usually use to obtain health information?

Will the COVID-19 risk level of the environment affect the COVID-19 knowledge and information behavior of college students?

What is the difference between college students' COVID-19 knowledge, information acquisition methods, information concerns, information demand scores, and information acquisition habits?

Will demographic factors, information acquisition methods, information attention content, information needs and information acquisition habits affect college students' knowledge of COVID-19?

2. METHODS

2.1. Sample

Figure 1. Geographical distribution of the study sample (n=3059)

This cross-sectional demographic study was conducted from March 3 to 4, 2020, using an online survey for data collection. This study selected three provinces in southwest China: Chongqing, Yunnan, and Guizhou. Their epidemic risk levels (according to the risk classification method of the China Health Commission) are high-risk, medium-risk, and low-risk. Their geographic location and their relationship with Wuhan are shown in Figure 1. This research plan surveys 1,000 college students in each province. Before the survey, online training was conducted for data collectors from these three provinces. In each province under investigation, there are 4 local data investigators who can find volunteers to assist in completing this questionnaire.The survey requires the consent of all participants. After accepting to participate in this study, the respondents conducted an electronic questionnaire survey through "Tencent QQ" or "WeChat" APP. The online survey was conducted for 48 hours, and the number of survey questionnaires was viewed 27 810 times. A total of 3278 questionnaires were received. Invalid questionnaires were excluded. A total of 3,059 valid questionnaires were collected. The effective rate of questionnaires was 93.31%. (Figure 1)

2.2. Variables

The knowledge part is based on the "New Coronavirus Infectious Pneumonia Diagnosis and Treatment Plan (6th Edition)" issued by the National Health Commission, and 13 questions have been formulated. Each question has 4 options, only one is completely correct. The correct answer is 1 point, the wrong answer is 0 points, and the full score is 13 points. A score higher than P_{75} is defined as good. There are a total of 9 questions in the information needs part, which are scored using the 5-point Likert scale, with a maximum score of 45 points. There are a total of 12 questions in the information acquisition habit, which are scored using the 5-point Likert scale. The maximum score is 60 points. There are a total of 7 questions in the information acquisition methods. The answer is "yes/no". The answer is "yes" and 1 point is counted. The highest score is 7 points. There are a total of 5 questions in the content of information topics, and the answer is "yes/no". The answer is "yes" and 1 point is counted, and the maximum is 5 points. The questionnaire of this study has been conducted three online discussions with experts in medicine, epidemiology and preventive medicine before being used. The reliability and validity of the questionnaire are obtained through prediction. Cronbach's Alpha: Knowledge is 0.678, information needs are 0.956, information acquisition methods are 0.762, information topics are 0.623, information acquisition habits are 0.880, and the entire questionnaire is 0.791. Quality assurance is achieved by monitoring the data collection process, data extraction, software data input and data analysis.

2.3. Data analysis

The data is input into IBM SPSS.23 software. The basic information of the sample uses descriptive statistics and frequency statistics. Univariate analysis used t test and analysis of variance (ANOVA). Use a multiple linear regression model to explore the decisive factors affecting college students' knowledge of COVID-19. In this study, $p<0.05$ was considered statistically significant.

3.RESULTS

3.1. Basic Information

A total of 3059 people participated in this study. Their average age is 20.74±1.76 years. Among them, men (50.57%) and women (49.43%). They live in rural areas (63.55%) and cities (36.45%). Provinces: Sichuan (33.14%), Yunnan (33.47%), Guizhou (33.39%). Grades: Freshman (37.95%), sophomore (15.95%), junior (26.48%), senior (19.61%). Science and engineering (48.9%) and liberal arts (51.1%) (Table 1).

Table 1. Demographic characteristics of participants in a survey about COVID-19,2020 (n = 3059)

Characteristics	
Age (year)	
Mean ± SD	20.74±1.76
Gender n (%)	
Male	1547(50.57)
Female	1512(49.43)
Current residencen n (%)	
Urban area	1115(36.45）
rural area	1194(63.55）
Graden n (%)	
Freshmen	1161(37.95)
Sophomores	488(15.95)
Juniors	810(26.48)
Seniors	600(19.61)
Subject category n (%)	
Sciences	1496(48.9)
Liberal arts	1563(51.1)
Region n (%)	
Sichuan Province	708（33.14）
Yunnan Province	718（33.47）
Guizhou Province	813（33.39）

3.2. COVID-19 knowledge

The average score of college students'COVID-19 knowledge score is 11.45 ± 1.34 points, of which 56.16% get good and above. Table 2 shows the responses of college students to each question in the knowledge section of COVID-19. College students' answers to the susceptible population of COVID-19 (48.15%), transmission route (32.0%) and population transmission source (34.4%) have a low accuracy rate, while the accuracy rate of other questions is above 88%. Boys have lower knowledge scores than girls. The knowledge score of urban students is higher than that of rural students. The knowledge scores of seniors are higher than those of the other three grades. The knowledge score of science students is lower than that of liberal arts students (Table 3).

Table 2. Responses to questions in knowledge about COVID-19 (n=3059),%

NO	Item	correct n (%)
K1	What's right about COVID-19?	2887（94.34）
K2	What is the viral host of COVID-19?	3046（99.58）
K3	What is the confirmed route of transmission of COVID-19?	2080（68.00）
K4	How long is the incubation period of COVID-19?	3017（98.63）
K5	What is the source of transmission of COVID-19?	2098（68.58）
K6	What kind of people are easily infected with COVID-19?	1473（48.15）
K7	The main clinical symptoms of COVID-19 are?	3029（99.02）
K8	What behaviors may increase the risk of COVID-19?	2886（94.34）
K9	Does serious illness increase the severity of COVID-19?	2696（88.13）
K10	Is low immunity easy to increase the risk of COVID-19?	2927（95.68）
K11	What behaviors can reduce the risk of COVID-19?	2971（97.12）
K12	What's right about washing hands frequently?	2947（96.34）
K13	What are the following measures to help prevent COVID-19?	2986（97.60）

Table 3. Univariable analysis of demographic determinants of knowledge about COVID-19, concluded from the survey ,2020

Variable	Knowledge		
	M±SD	t/F	p
Gender			
Male	11.35±1.40	4.26	<0.001
Female	11.56±1.27		
Current residencen			
Urban area	11.58±1.30	-3.89	<0.001
rural area	11.38±1.36		
Gradend			
Freshmen	11.33±1.33	13.23	<0.001
Sophomores	11.29±1.40		
Juniors	11.61±1.29		
Seniors	11.63±1.34		
Subject category			
Sciences and engineering	11.37±1.39	3.60	<0.001
Liberal arts	11.54±1.29		
region			
Sichuan Province	11.48±1.24	1.73	0.183
Yunnan Province	11.00±1.48		

Guizhou Province	11.46±1.35

3.3. COVID-19 information acquisition methods and information topic

56.42% of students have 3 or less ways to obtain daily information. Table 4 shows how college students choose to obtain COVID-19 information every day. "TV" (86.6%), "Internet" (79.4%), "family and friends" (50.2%), and "schools and teachers" (48.2%) are the top four ways to obtain information. Table 5 shows how college students are concerned about the information content of COVID-19. The topics that college students are most concerned about are "Changes in the number of new patients with COVID-19 (94.4%)", "Prevention methods for COVID-19 (89.1%)", "Disease characteristics (75.5%)" and "Dangerous diseases factors (75.5%)". College students pay the least attention to the negative news about COVID-19 (13.3%). 48.48% of students pay attention to the following topic at the same time every day: "Number of new COVID-19 patients", "Disease characteristics", "Related risk factors" and "preventive measures." The average score of girls' information topic was significantly higher than that of boys. The average score of urban students' information acquisition methods was significantly higher than that of rural students (Table 6、7).

Table 4. Responses to questions in information acquisition methods about COVID-19 (n=3059),%

NO	Item	Yes n(%)
M1	Do you get COVID-19information from the Internet every day?	2429 (79.41)
M2	Do you get COVID-19information from your family, relatives and friends every day?	1544 (50.47)
M3	Do you get COVID-19information from your university and teachers every day?	1475 (48.22)
M4	Do you get COVID-19information from your community staff every day?	853 (27.88)
M5	Do you get COVID-19information from TV every day?	2649 (86.60)
M6	Do you get COVID-19information from newspapers every day?	522 (18.05)
M7	Do you get COVID-19information from other sources (other than the above) every day?	952 (31.12)

Table 5. Responses to questions in topic about COVID-19 (n=3059),%

NO	Item	Yes n (%)
S1	Do you pay attention to the characteristics of COVID-19 symptoms every day?	2309 (75.48)
S2	Do you pay attention to the pathogenic factors of COVID-19 every day?	2310 (75.51)
S3	Do you focus on COVID-19 prevention every day?	2724 (89.05)

S4	Do you pay attention to the changes in the number of diagnosed COVID-19 patients every day?	2889 (94.44)
S5	Do you pay attention to negative public opinion of COVID-19 every day?	407 (13.31)

Table 6. Univariable analysis of demographic determinants of information acquisition methods about COVID-19, concluded from the survey ,2020

Variable	information acquisition methods		
	M±SD	t / F	p
Gender			
Male	3.39±1.74	0.97	0.329
Female	3.45±1.60		
Current residence			
Urban area	3.52±1.75	-2.54	0.011
rural area	3.36±1.62		
Gradend			
Freshmen	3.42±1.63	0.85	0.462
Sophomores	3.52±1.77		
Juniors	3.37±1.63		
Seniors	3.39±1.72		
Subject category			
Sciences and engineering	3.45±1.71	-1.17	0.239
Liberal arts	3.38±1.63		
Region			
Sichuan Province	3.50±1.71	1.90	0.155
Yunnan Province	3.91±1.70		
Guizhou Province	3.40±1.67		

Table 7. Univariable analysis of demographic determinants of information topic about COVID-19,concluded from the survey ,2020

Variable	information acquisition methods		
	M±SD	t / F	p
Gender			
Male	3.39±1.07	4.79	<0.001
Female	3.56±0.96		
Current residence			
Urban area	3.46±1.03	0.77	0.441

rural area	3.49±1.01		
Gradend			
Freshmen	3.45±0.98	1.52	0.206
Sophomores	3.51±1.04		
Juniors	3.45±1.05		
Seniors	3.55±1.02		
Subject category			
Sciences and engineering	3.44±1.04	1.77	0.076
Liberal arts	3.51±0.99		
Region			
Sichuan Province	3.39±1.10	1.67	0.193
Yunnan Province	3.63±0.84		
Guizhou Province	3.49±1.01		

3.4. Information needs of COVID-19

The average score of information needs of college students is 38.13 ± 6.11. More than 80% of students hope to learn more about COVID-19. The information needs score of boys is lower than that of girls. The information demand score of urban students is higher than that of rural students (Table 8).

Table 8. Univariable analysis of demographic determinants of information needs about COVID-19, concluded from the survey ,2020

Variable	information acquisition methods		
	M±SD	t / F	p
Gender			
Male	37.62±6.48	4.59	<0.001
Female	38.63±5.68		
Current residence			
Urban area	38.43±6.27	-2.04	0.041
rural area	37.96±6.01		
Gradend			
Freshmen	38.24±5.77	0.30	0.820
Sophomores	37.95±6.35		
Juniors	38.05±6.34		
Seniors	38.17±6.25		
Subject category			
Sciences and engineering	38.26±6.14	-1.16	0.245
Liberal arts	38.00±6.08		
Region			
Sichuan Province	37.46±6.76	1.75	0.179

Yunnan Province	37.63±7.41
Guizhou Province	38.21±6.01

3.5. Information acquisition habits of health information

The average score of information acquisition habits of college students is 43.39±7.60 points. Before the outbreak, mobile phones (34.5%), the Internet (32.5%) and TV/radio (30.9%) were the main ways for college students to obtain health information. The average score of boys' information acquisition habits is higher than that of girls. The average score of urban students' information acquisition habits is higher than that of rural students. The average score of information acquisition habits of science and engineering students is higher than that of liberal arts students (Table 9).

Table 9. Univariable analysis of demographic determinants of information acquisition habit about COVID-19, concluded from the survey ,2020

Variable	information acquisition habit		
	M±SD	t/F	p
Gender			
Male	44.77±7.97	-6.03	<0.001
Female	43.12±7.12		
Current residence			
Urban area	44.20±7.92		
rural area	43.78±7.40	-1.43	0.151
Gradend			
Freshmen	43.90±7.45	1.78	0.148
Sophomores	44.46±7.66		
Juniors	43.50±7.80		
Seniors	44.16±7.55		
Subject category			
Sciences and engineering	44.54±7.69	-4.30	<0.001
Liberal arts	43.36±7.46		
Region			
Sichuan Province	44.38±8.11	5.13	0.008
Yunnan Province	47.40±6.81		
Guizhou Province	43.84±7.54		

3.6. Impact of environmental epidemic risk and the decisive factor of COVID-19 knowledge

Table 10. Multiple linear regression analysis of demographic determinants and other influencing factors of knowledge about COVID-19, concluded from the survey ,2020

Variable	Knowledge			
	Unstandar--dized B	Standar-dized B	*t*	Sig.
Contrast	11.765	-	29.465	<0.001
Gender	-0.110	-0.041	-2.180	0.029
Age	-0.072	-0.093	-3.331	0.001
Grade	0195	0.169	6.156	<0.001
Regional risk level	-0.089	-0.021	-1.172	0.241
Subject category	-0.166	-0.062	-3.355	<0.001
Current residence	0.148	0.053	2.902	0.004
Information needs	0.019	0.087	4.517	<0.001
Information acquisition methods	0.038	0.047	2.415	0.016
Information acquisition habit	-0.003	-0.016	-0.801	0.423
Information topic	0.075	0.057	2.953	0.003

Table 6,7,8,9 show the survey of COVID-19 knowledge and related information among college students in three areas with different epidemic risks. This study only observed differences in the scores of college students' health information acquisition habits in the three regions. College students currently living in Yunnan Province scored the highest in their health information acquisition habits. Before the outbreak, college students currently living in Yunnan Province obtained more health information from " family members", " professional books, "community propaganda" and "newspapers or magazines".Table 10 shows that gender, grade, major, current residence, information needs, information acquisition methods and information topic affect college students' COVID-19 knowledge level.

4. DISCUSSION

Analysis of the answers to the COVID-19 knowledge questions of college students found that 56.16% of college students' COVID-19 knowledge scores are above good. This ratio is higher than our survey results on January 30. At that time, our investigation found that the general public's COVID-19 knowledge rate was 5.4% [5]. This result proves that the public health strategy and health communication strategy adopted by the government in the early stage have a certain effect on raising the awareness of COVID-19 among college students. College students have a good understanding of virus names, virus hosts, incubation period, clinical symptoms, hand-washing methods, and disease risk-increasing factors (the correct rate is above 88%). However, their answer to the three knowledge points of susceptible population, transmission route and population transmission source is relatively low. The reason for this phenomenon may be: with the development of the epidemic, the clinical characteristics of the disease are constantly being summarized, and the disease treatment guidelines are constantly being updated, but some college students may not have acquired this new knowledge. Therefore, how to help college students update their knowledge of the disease in a timely manner is also a top priority for the prevention and control of COVID-19.

This study analyzed the information-related behavior of college students and found that during the pandemic, television and the Internet are the main ways for college students to obtain COVID-19-related information. During the COVID-19 epidemic, the main way for college students to obtain COVID-19 information is the same as their main way to obtain health information before the epidemic. However, before COVID-19, the Internet ranked first. After COVID-19, TV ranked first. Analyzing the reason, it may be related to the national media, which broadcasts the COVID-19 information more credible. Therefore, it is very important to increase the spread of COVID-19 information in national and local television media, popular portals and social media.

Especially through these channels to report clinical discovery of new disease information.

From the daily information acquisition channels of college students, it can be seen that during the COVID-19 epidemic, "family and friends (50.2%)", "schools and teachers (48.2%)" have also become important sources for college students to obtain COVID-19 information. What deserves attention is the way to get information about "schools and teachers". During the investigation, all Chinese universities were closed, and students were studying online at home. Schools and teachers have the opportunity to keep in touch with students regularly through the Internet. Therefore, the government can cooperate with the education department to strengthen the construction of school health information dissemination channels, and timely disseminate COVID-19-related information to students, especially clinically updated disease information. In addition, digital health literacy education interventions can also be conducted through schools to enhance students' understanding, acquisition and decision-making capabilities of COVID-19 information.

Studies have found that public awareness of infectious diseases will affect the occurrence and prevalence of infectious diseases. People who know more about infectious diseases are more willing to learn about hygiene and are more willing to maintain good personal hygiene habits. If people know little about the prevention and treatment of infectious diseases, their ability to maintain health may be insufficient. This study found that gender, grade, major, current residence, information needs, information acquisition methods, and information topics all affect college students' understanding of COVID-19. Therefore, combined with the research results, we suggest that it is necessary to strengthen the use of different publicity methods and channels to disseminate knowledge of COVID-19, the latest disease characteristics, related risk factors and prevention measures. Especially when a new version of disease-related information appears, it is necessary to emphasize with the public the differences between the new version and the old version.

The study found that, despite the different levels of epidemic risk, college students have different information acquisition habits. However, during the COVID-19 period, the regional epidemic risk level will not have a significant impact on the information behavior and COVID-19 knowledge of college students. In addition, we suggest that in the COVID-19 health education of college students, the health belief education of college students should be strengthened to promote them to transform knowledge into action.

Limited by the sample size and sampling method of this questionnaire, when the sample size increases, the results of this survey may change. However, through this survey, we can understand the COVID-19 knowledge level, information acquisition methods, information topics, information needs and characteristics of information acquisition habits of college students, aiming to provide reference for the prevention work of relevant departments, control and intervention decision-making. At present, the global public is still facing a serious health threat from COVID-19. This is not only a global war against COVID-19, but also a health education course for ordinary people. COVID-19 may even have an impact on the life philosophy and lifestyle of the public. Therefore, the experience of different national public health strategies and health communication strategies will help the global COVID-19 governance. We suggest that in response to the behaviors and needs of different groups of people, we should more accurately use multiple channels and adopt multiple propaganda methods to promptly and effectively disseminate disease-related information to the society to guide the public to respond.

5. CONCLUSION

We suggest that in response to the behaviors and needs of different groups of people, we should more accurately use multiple channels and adopt multiple propaganda methods to promptly and effectively disseminate disease-related information to the society to guide the public to respond.

AUTHORS' CONTRIBUTIONS

LL conceived the study,designed the research tools, contributed to the data collection, carried out data analyses and interpretation. LL and SNQ drafted the manuscript. All authors have read and approved the final manuscript.

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